

Newport, Rhode Island: the wharves were flooded by the very high tide of the 23d.

New York City: the highest tide known for forty-five years occurred on the 24th; much damage resulted from cellars and sewers overflowing. At 10 a. m. the water had reached a mark four inches higher than the flood of February, 1885, when the East River was higher than for a quarter of a century. The Harlem River rose three feet and eight inches above high-water mark. Wharves along the Hudson River, as far as Poughkeepsie, were flooded.

Long Branch, New Jersey, 24th: the damage caused by high tides along this part of the New Jersey coast is very heavy; bathing houses were washed away, and wharves badly damaged.

Cape Mendocino, California: the highest tide ever known in Humboldt county occurred on the 24th; the water backed up to a great distance on every side from the main rivers; from the adjoining hills the lowlands looked like a vast ocean. At Eureka the lumber mills were compelled to shut down, the water overflowing the wharves. Thousands of acres supposed to have been above high-water mark were inundated.

Pysht, Washington Territory, 24th: an unusually high tide at 2 p. m.; the highest known for several years.

Chatham, Massachusetts: an unusually high tide occurred on the 24th; Chatham beach was almost submerged.

Atlantic City, New Jersey, 24th: the tide this morning is the heaviest for years. Much damage was done to property along the ocean front.

Cape May, New Jersey: very high tides occurred on the 23d and 24th. Much of the beach front was washed away, and wharves, etc., demolished and carried out to sea. Railroad travel was suspended on account of the high water.

New Haven, Connecticut: the highest tide in twenty-nine years occurred on the 24th; it rose three feet above high-water mark, and covered the wharves.

High tides also occurred at the following places:

Portland, Maine, 24th, 25th.

Eastport, Maine, 24th, 25th, 26th.

Narragansett Pier, Rhode Island, 24th.

Chincoteague, Virginia, 23d, 24th.

Sandy Hook, New Jersey, 23d, 24th.

Cedar Keys, Florida, 22d.

Pysht, Washington Territory, 23d.

Tatoosh Island, Washington Territory, 7th.

Taunton, Massachusetts, 24th, 25th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for November, 1885, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 79.90 per cent. The percentages for the four elements are: Weather, 84.25; direction of the wind, 76.88; temperature, 77.23; barometer, 84.83 per cent. By geographical districts, they are: For New England, 75.48; middle Atlantic states, 83.01; south Atlantic states, 85.28; eastern Gulf states, 84.15; western Gulf states, 82.27; lower lake region, 77.27; upper lake region, 76.66; Ohio Valley and Tennessee, 82.31; upper Mississippi valley, 76.11; Missouri Valley, 77.17. There were twenty-four omissions to predict, out of 2,934, or 0.82 per cent. Of the 2,910 predictions that have been made, one hundred and twenty-seven, or 4.36 per cent., are considered to have entirely failed; one hundred and forty-eight, or 5.09 per cent., were one-fourth verified; four hundred and forty-nine, or 15.43 per cent., were one-half verified; four hundred and eighty-nine, or 16.80 per cent., were three-fourths verified; 1,697, or 58.32 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

The percentages of verifications of special predictions for certain localities are, as follows:

Omaha, Nebraska (twenty-five days), 84.69; Arkansas, (twenty-five days), 82.00; Tennessee (twenty-four days), 84.26; Georgia (twenty-five days), 86.50; Washington City (twenty-

nine days), 79.31; Baltimore, Maryland (twenty-eight days), 86.11; Erie, Pennsylvania, 66.25; Boston, Massachusetts, 77.50; Portland, Maine (twenty-nine days), 72.41; Albany, New York, 81.67; Pittsburg, Pennsylvania, 66.67; Cincinnati, Ohio, 77.50; Louisville, Kentucky, 83.33; Columbus, Ohio, 71.67; Cleveland, Ohio, 57.64; Indiana, 83.33; Oswego, New York, 63.33; Rochester, New York, 63.33; Buffalo, New York, 62.50; Milwaukee, Wisconsin, 73.33; Chicago, Illinois, 76.67; Detroit, Michigan, 74.17; Toledo, Ohio, 73.33; Sandusky, Ohio, 67.50; Cairo, Illinois, 87.71; Saint Louis, Missouri, 88.56; Memphis, Tennessee, 80.83; Shreveport, Louisiana, 87.91; Iowa (twenty-nine days), 76.21.

CAUTIONARY SIGNALS.

During November, 1885, two hundred and fourteen cautionary signals were ordered. Of these, one hundred and fifty-eight, or 73.83 per cent., were justified by winds of twenty-five miles or more per hour, at or within one hundred miles of the station. Sixty-two cautionary off-shore signals were ordered, of which number, forty, or 64.52 per cent., were fully justified both as to direction and velocity; fifty-six, or 90.32 per cent., were justified as to direction, and forty-eight, or 77.42 per cent., were justified as to velocity. Two hundred and seventy-six signals of all kinds were ordered, one hundred and ninety-eight, or 71.74 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, forty-one were changed from cautionary signals. Five signals were ordered late. In forty-two cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During the month there were one hundred and fifty cold-wave signals displayed. Of these, there were one hundred and twenty-six, or 84.0 per cent., justified. In eight cases the signals were considered to have been ordered late.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for November, 1885, states:

The verifications of predictions for the whole area was 86 per cent. for temperature, and 90 per cent. for weather.

The following roads comprise this system: Western of Alabama; South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Atlanta and Charlotte Air Line; Western and Atlantic; Georgia; East Tennessee, Virginia and Georgia system in Georgia; and Savannah, Florida and Western.

ATMOSPHERIC ELECTRICITY.

AUROSAS.

Auroral displays occurred during November, as follows:

Alpena, Michigan, 7th: an aurora was observed at 7.20 p. m., consisting of a diffused light, resting on a dark segment, from which a few small streamers, having an apparent motion from east to west, were noted; the display disappeared at 10.30 p. m.

Mackinaw City, Michigan, 7th: an aurora was observed from 9.30 to 10.30 p. m., consisting of a segment above a bank of clouds of 30° altitude; the light was of a pale yellow color; occasionally a streamer was observed to shoot up above the clouds to an altitude of 65°. At 10 p. m. the sky became obscured.

Fort Buford, Dakota, 7th: an aurora, consisting of a pale white light, was visible from 9.22 p. m. until near midnight; the sky was obscured at intervals.

Fort Totten, Dakota, 7th: an auroral light, of pale yellow color, was observed in the north from 8 to 11 p. m.; the display was partially obscured by clouds.

Fort Sully, Dakota, 7th: there was a faint auroral glow in the north between 8 p. m. and 12.30 a. m. of the 8th.

Fort Bennett, Dakota, 7th: a faint auroral light was observed between 8.10 and 11.30 p. m., in the north-northeast,

Table of miscellaneous meteorological data for November, 1885—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).					Temperature of the air (in degrees Fahrenheit).										Winds.																	
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.		Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.		No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.								
					Highest barometer.	Lowest barometer.				Max.	Min.		Greatest.	Least.							Miles p. h.	Direction.												
New England.																																		
Eastport	61	29.82	-.15	29.89	30.40	1	29.41	100.08	39.2	3.8	57.1	8	44.6	24.2	33.8	32.9	16.3	19	4.5	14	77.1	32.4	4.78	+	0.06	8,513	ne.	45	ne.	25	12	8	16	6
Portland	99	29.80	-.16	29.91	30.39	1	29.52	100.86	38.4	0.3	55.1	8	44.2	19.9	33.2	35.6	18.9	28	4.2	78.1	32.9	3.43	+	0.31	5,666	ne.	50	se.	3	10	9	17	7	
Mount Washington	6,279	23.51	-.30	30.07	30.50	6	29.55	100.96	21.4	5.0	51.0	27	5.8	5.8	15.8	45.2	24.3	9	3.9	169.4	90.2	6.67	+	0.05	23,100	nw.	95	nw.	10	20	3	18	9	
Boston	125	29.76	-.21	29.89	30.40	1	29.47	100.94	43.8	4.5	58.8	10	50.8	23.3	37.2	45.5	25.0	5	4.7	24.7	43.6	5.78	+	0.72	9,332	w.	46	ne.	25	12	13	8	9	
Block Island	27	29.89	-.21	29.91	30.33	1	29.50	100.83	47.1	2.2	64.0	8	51.9	31.4	42.9	32.6	17.8	19	2.5	33.4	42.6	4.79	+	0.42	13,344	sw.	47	ne.	26	12	13	15	3	
Narragansett Pier	107	29.81	-.20	29.92	30.32	27	29.53	100.79	42.4	1.7	68.0	8	52.3	23.0	38.0	45.0						2.34	+	0.50										
New Haven	107	29.81	-.20	29.92	30.32	27	29.53	100.79	42.4	1.7	64.8	12	49.5	19.1	35.6	45.7	23.4	1	5.0	24	75.8	34.8	3.49	+	0.51	6,837	n.	32	e.	2	11	11	13	6
New London	47	29.81	-.20	29.92	30.32	27	29.53	100.79	42.4	1.7	64.8	12	49.5	19.1	35.6	45.7	23.4	1	5.0	24	75.8	34.8	3.49	+	0.51	6,837	n.	32	e.	2	11	11	13	6
Middle Atlantic States.																																		
Albany	83	29.86	-.19	29.95	30.40	27	29.61	100.79	40.6	1.7	67.7	7	46.9	15.0	34.7	52.7	22.7	1	4.3	10	75.3	33.0	3.90	+	1.33	5,095	s.	28	se.	1	15	18	10	2
New York City	104	29.76	-.21	29.94	30.34	27	29.57	100.75	44.8	2.2	68.6	13	52.5	25.0	39.2	43.6	25.5	19	4.9	26	71.4	35.5	5.05	+	1.70	7,698	nw.	40	nw.	10	11	9	15	6
Philadelphia	117	29.84	-.22	29.96	30.37	28	29.62	100.75	45.0	1.8	71.0	7	51.9	28.8	38.1	42.2	20.1	12	5.6	27	74.9	36.9	3.35	+	0.15	7,828	nw.	32	ne.	23	11	13	12	5
Atlantic City	13	29.92	-.23	29.93	30.34	28	29.54	100.80	46.4	2.1	64.7	7	53.3	26.8	39.3	37.9	22.1	1	4.5	30	82.6	40.9	6.84	+	3.40	6,645	nw.	37	n.	23	14	9	15	6
Barnegat City	22	29.92	-.21	29.93	30.34	27	29.56	100.78	47.0	3.1	64.6	12	52.6	31.2	41.4	43.4	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	w.	50	e.	23	14	9	15	6
Cape May	27	29.92	-.21	29.93	30.34	27	29.56	100.78	47.0	3.1	64.6	12	52.6	31.2	41.4	43.4	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	w.	50	e.	23	14	9	15	6
Little Egg Harbor	27	29.92	-.21	29.93	30.34	27	29.56	100.78	47.0	3.1	64.6	12	52.6	31.2	41.4	43.4	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	w.	50	e.	23	14	9	15	6
Sandy Hook	28	29.92	-.21	29.94	30.36	27	29.57	100.79	46.2	1.6	72.0	8	52.7	29.8	41.2	42.1	24.2	18	3.9	26	78.2	39.5	4.83	+	0.76	14,290	nw.	53	ne.	23	10	10	14	6
Cape Henlopen	72	29.98	-.20	29.98	30.38	27	29.56	100.78	47.0	3.1	64.6	12	52.6	31.2	41.3	43.9	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	n.	50	e.	23	14	9	15	6
Baltimore	45	29.93	-.22	29.97	30.38	27	29.62	100.76	45.3	0.4	73.5	12	53.0	32.5	39.8	41.0	24.1	5	4.2	27	70.0	35.6	4.04	+	1.00	4,199	nw.	23	sw.	5	13	13	14	3
Ocean City	106	29.88	-.20	29.98	30.38	27	29.62	100.76	45.3	0.4	73.5	12	53.0	32.5	39.8	41.0	24.1	5	4.2	27	70.0	35.6	4.04	+	1.00	4,199	nw.	23	sw.	5	13	13	14	3
Washington City	106	29.88	-.20	29.98	30.38	27	29.62	100.76	45.3	0.4	73.5	12	53.0	32.5	39.8	41.0	24.1	5	4.2	27	70.0	35.6	4.04	+	1.00	4,199	nw.	23	sw.	5	13	13	14	3
Cape Henry	16	29.98	-.20	29.98	30.38	27	29.56	100.78	47.0	3.1	64.6	12	52.6	31.2	41.3	43.9	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	n.	50	e.	23	14	9	15	6
Cape Henry	16	29.98	-.20	29.98	30.38	27	29.56	100.78	47.0	3.1	64.6	12	52.6	31.2	41.3	43.9	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	n.	50	e.	23	14	9	15	6
Chincoteague	8	29.96	-.22	29.95	30.37	27	29.55	100.82	48.7	0.8	66.9	12	54.7	31.2	39.3	37.9	22.1	1	4.5	30	82.6	40.9	6.84	+	3.40	6,645	nw.	41	ne.	23	9	9	13	8
Lynchburg	652	29.30	-.18	30.00	30.40	27	29.65	100.75	45.5	0.3	71.6	12	54.8	28.3	36.9	43.3	33.5	11	4.6	29	77.8	38.3	2.83	+	0.52	2,268	nw.	15	n.	2	12	8	16	7
Norfolk	30	29.95	-.18	29.98	30.36	27	29.57	100.78	47.0	3.1	64.6	12	52.6	31.2	41.3	43.9	22.0	1	2.3	30	83.2	42.0	4.89	+	0.66	11,585	n.	50	e.	23	14	9	15	6
South Atlantic States.																																		
Charlotte	808	29.17	-.15	30.02	30.40	27	29.63	100.77	49.1	0.6	75.7	6	51.8	27.7	39.8	48.0	29.3	30	5.8	29	72.6	39.5	4.10	+	0.04	3,131	n.	17	nw.	25	12	7	11	12
Fort Macon	11	30.01	-.15	29.99	30.36	27	29.56	100.81	54.5	1.0	72.1	8	51.2	34.2	47.6	38.0	21.6	12	4.6	68.4	50.3	3.58	+	0.78	8,885	n.	36	n.	20	11	4	13	13	
Hatteras	12	29.99	-.16	29.98	30.37	27	29.57	100.80	54.7	1.5	77.0	8	51.1	35.0	48.5	38.0	24.2	3	4.2	25	75.4	46.7	3.65	+	0.63	8,153	n.	36	n.	20	12	4	14	12
Kitty Hawk	9	30.00	-.18	29.99	30.38	27	29.59	100.78	52.0	1.1	74.9	8	51.1	35.0	48.5	38.0	24.2	3	4.2	25	75.4	46.7	3.65	+	0.63	8,153	n.	36	n.	20	12	4	14	12
Smithville	34	29.98	-.16	29.99	30.36	27	29.57	100.80	54.7	1.5	77.0	8	51.1	35.0	48.5	38.0	24.2	3	4.2	25	75.4	46.7	3.65	+	0.63	8,153	n.	36	n.	20	12	4	14	12
Charleston	52	29.99	-.16	29.99	30.36	27	29.57	100.80	54.7	1.5	77.0	8	51.1	35.0	48.5	38.0	24.2	3	4.2	25	75.4	46.7	3.65	+	0.63	8,153	n.	36	n.	20	12	4	14	12
Augusta	183	29.97	-.15	30.01	30.37	27	29.68	100.76	52.4	1.4	74.9	6	56.3	34.0	51.2	44.1	21.9	1	8.7	30	74.4	44.9	1.94	+	1.34	5,951	n.	36	n.	20	12	4	14	12
Savannah	87	29.96	-.15	30.01	30.37	27	29.68	100.76	52.4	1.4	74.9	6	56.3	34.0	51.2	44.1	21.9	1	8.7	30	74.4	44.9	1.94	+	1.34	5,951	n.	36	n.	20	12	4	14	12
Jacksonville	43	30.01	-.08	30.02	30.27	27	29.65	100.76	52.4	1.4	74.9	6	56.3	34.0	51.2	44.1	21.9	1	8.7	30	74.4	44.9	1.94	+	1.34	5,951	n.	36	n.	20	12	4	14	12
Florida Peninsula.																																		
Cedar Keys	22	30.02	-.09	30.00	30.21	26	29.71	100.50	60.4	3.2	78.6	7	67.6	38.8	53.9	39.8	21.6	17	3.6	30	82.6	54.9	1.17	+	1.68	5,220	n.	33	n.	19	5	5	11	14
Key West	20	30.03	-.02	30.00	30.18	26	29.85	100.34	71.6	3.1	84.0	6	76.1	56.2	68.1	27.8	16	22	4.2	29	79.6	64.8	0.43	+	2.09	7,353	n.	28	n.	20	3	5	17	8
Sanford	25	30.04	-.03	30.01	30.22	26	29.72	100.35	62.7	4.4	86.5	6	73.1	34.9	53.9	51.6	32.3	27	1.3	30	74.4	53.4	0.29	+	0.61	3,625	n.	20	n.	9	5	9	16	
Eastern Gulf States.																																		
Atlanta	1,129	28.87	-.13	30.06	30.35	27	29.70	100.66	50.2	1.2	73.0	6	58.5	29.2	42.5	43.8	26.8	10	5.8	28	69.9	39.4	3.98											

Table of miscellaneous meteorological data for November, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).				Temperature of the air (in degrees Fahrenheit).														Winds.												
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.			Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.		No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.					
					Highest barometer.	Lowest barometer.				Max.	Min.		Greatest.	Least.	Miles p.hr.							Direction.										
					Date.	Date.				Date.	Date.		Date.	Date.	Date.							Date.										
Upper Mississippi Valley.																																
Saint Paul.....	831	29.06	-.03	30.00	30.36	29.41	70.95	33.3	+2.3	52.7	10	39.7	17.2	15	27.3	35.5	29.1	16	4.2	30	85.2	29.1	0.60	-.077	4,030	w.	24	ne.	6	6	14	13
La Crosse.....	725	29.17	-.11	29.97	30.34	29.42	70.92	33.0	+2.0	52.0	11	44.0	20.8	27	32.6	37.2	23.7	16	3.8	30	75.6	30.8	0.60	-.139	4,945	n.w.	30	n.w.	18	6	15	11
Davenport.....	615	29.22	-.13	29.99	30.30	29.48	70.88	32.1	+1.8	51.1	11	46.5	22.7	14	31.6	37.2	23.7	16	3.8	30	75.6	30.8	0.60	-.139	4,945	n.w.	30	n.w.	18	6	15	11
Des Moines.....	849	29.07	-.13	29.99	30.42	29.35	70.99	32.2	+2.0	52.3	11	48.0	21.4	14	32.2	44.4	27.2	10	5.0	19	77.2	32.3	0.61	-.158	4,122	n.	16	s.	24	6	12	7
Dubuque.....	665	29.26	-.13	29.98	30.36	29.45	70.90	32.7	+2.4	51.2	11	45.7	21.4	14	32.0	44.4	27.2	10	5.0	19	77.2	32.3	0.61	-.158	4,122	n.	16	s.	24	6	12	7
Keokuk.....	618	29.30	-.14	29.98	30.35	29.41	70.94	32.6	+2.0	52.1	11	50.7	22.1	14	32.6	31.1	34.7	12	5.0	19	77.2	32.3	0.61	-.158	4,122	n.	16	s.	24	6	12	7
Cairo.....	359	29.05	-.16	30.02	30.30	29.58	70.82	32.4	+2.7	50.6	11	55.6	22.1	14	32.0	47.9	28.3	16	3.3	24	75.5	32.6	0.88	-.121	3,358	n.w.	28	sw.	7	7	9	10
Springfield.....	644	29.29	-.17	29.97	30.32	29.46	70.87	32.5	+3.8	51.6	11	55.6	22.1	14	38.0	47.9	28.3	16	3.3	24	75.5	32.6	0.88	-.121	3,358	n.w.	28	sw.	7	7	9	10
Saint Louis.....	571	29.39	-.16	30.01	30.32	29.54	70.78	32.7	+5.0	52.2	11	56.2	21.8	13	40.4	44.3	30.5	12	4.2	24	72.1	33.7	1.68	-.101	9,000	w.	41	se.	6	7	9	10
Missouri Valley.																																
Lamar.....	1,028	28.92	.....	30.03	30.38	29.50	60.88	47.2	.....	80.0	11	59.3	21.6	25	36.7	58.4	37.0	12	6.4	29	64.0	33.7	0.49	.....	7,777	sw.	37	sw.	6	3	5	14
Leavenworth.....	842	29.10	-.15	30.02	30.39	29.50	61.03	43.5	+3.5	75.3	17	53.8	26.0	14	34.0	49.5	38.9	10	8.7	23	67.6	32.7	1.86	-.062	4,403	sw.	30	sw.	12	4	8	10
Omaha.....	1,113	28.82	-.12	30.04	30.39	29.50	61.03	39.9	+4.0	68.1	10	48.3	21.5	14	32.0	41.6	24.9	20	6.9	20	80.3	33.9	0.73	-.063	5,040	n.w.	30	n.w.	12	4	8	10
Valentine.....	2,603	27.23	.....	30.04	30.41	29.55	60.86	37.3	.....	58.9	20	50.7	16.1	8	27.0	52.8	38.6	19	7.1	24	70.4	27.3	0.37	.....	7,482	n.w.	54	n.	11	2	9	12
Fort Bennett.....	1,510	28.36	.....	30.05	30.41	29.55	61.08	33.6	+4.4	54.4	20	43.7	12.1	8	25.7	42.3	31.3	10	4.5	6	78.5	27.3	0.28	-.001	5,442	se.	44	n.	7	3	6	17
Fort Sully.....	1,307	28.57	-.09	30.05	30.40	29.54	60.85	30.0	+0.4	55.0	21	38.5	7.8	14	22.8	47.2	29.7	20	4.5	6	70.6	21.5	1.50	+1.18	5,467	se.	38	ne.	6	3	6	15
Huron.....	1,228	28.66	-.13	30.04	30.37	29.54	61.03	34.8	+2.7	67.5	10	45.6	18.4	25	26.5	49.1	35.0	16	7.3	18	81.0	29.1	2.69	+2.34	5,900	n.w.	36	n.w.	12	5	8	10
Northern slope.																																
Fort Assinaboine.....	2,720	27.02	-.18	30.02	30.35	29.65	60.70	40.3	+11.8	64.1	18	52.3	14.6	4	25.6	49.5	46.8	1	13.4	27	60.3	27.0	0.16	-.095	7,846	w.	42	w.	8	5	5	14
Fort Benton.....	2,681	27.07	-.18	30.03	30.39	29.64	60.75	41.3	+13.8	68.0	18	56.1	15.9	4	28.0	52.1	44.8	1	12.7	27	60.3	27.0	0.16	-.095	7,846	w.	42	w.	8	5	5	14
Fort Ouster.....	3,040	26.70	-.14	30.08	30.44	29.64	60.81	39.2	+7.7	72.3	8	54.6	9.8	12	25.0	62.5	44.0	1	13.0	21	68.6	28.5	0.24	+0.26	4,170	se.	24	n.	11	6	9	13
Fort Maginnis.....	4,340	25.43	.....	30.03	30.33	29.70	60.63	41.8	+8.2	61.5	20	51.2	20.2	29	20.2	41.3	36.1	1	13.0	21	57.0	26.6	0.07	+0.06	6,473	n.	44	n.	11	6	9	13
Fort Shaw.....	3,550	26.22	.....	30.05	30.38	29.67	60.72	41.8	+11.1	69.2	18	47.5	9.2	4	30.9	54.3	37.8	1	13.0	21	57.0	26.6	0.07	+0.06	6,473	n.	44	n.	11	6	9	13
Helena.....	4,044	25.72	-.18	30.05	30.44	29.66	60.78	39.1	+9.5	60.9	18	47.5	19.8	12	30.4	41.1	30.4	7	9.8	10	62.8	27.1	0.15	-.053	4,561	sw.	28	sw.	20	5	3	13
Poplar River.....	2,030	27.77	.....	30.07	30.43	29.67	60.76	32.4	.....	70.0	16	42.4	10.2	30	21.7	44.8	30.4	7	9.8	10	62.8	27.1	0.15	-.053	4,561	sw.	28	sw.	20	5	3	13
Deadwood.....	4,600	25.10	-.06	30.14	30.40	29.73	60.73	41.0	+8.9	63.2	20	50.5	15.3	12	31.4	47.9	33.7	11	10.8	6	71.7	32.0	1.40	+0.33	2,352	sw.	24	sw.	11	6	3	10
Cheyenne.....	6,105	23.94	-.07	30.16	30.46	29.61	60.85	39.0	+5.7	67.1	2	51.3	15.9	12	27.4	51.2	42.7	1	4.3	6	58.0	24.1	1.11	-.085	8,376	n.w.	44	n.w.	21	5	2	17
North Platte.....	2,841	27.02	-.12	30.08	30.44	29.41	61.03	39.5	+5.1	63.0	19	50.8	23.3	13	30.7	39.7	32.2	15	3.2	27	79.9	33.3	1.71	+1.39	4,637	w.	40	n.w.	6	9	9	18
Middle slope.																																
Denver.....	5,294	24.70	-.08	30.19	30.53	29.59	50.94	42.9	+5.4	75.0	10	57.0	11.2	12	30.8	63.8	41.7	10	8.2	5	55.8	25.9	0.55	-.015	5,066	s.	35	n.	11	6	8	7
Pike's Peak.....	14,134	17.74	.....	30.39	30.75	29.79	50.96	33.8	+3.1	33.2	9	18.4	9.0	12	8.2	42.2	28.3	7	3.0	29	84.5	9.8	0.87	+1.07	17,057	w.	72	n.w.	6	8	0	17
West Las Animas.....	3,899	26.01	-.07	30.10	30.45	29.46	50.99	41.9	+5.0	79.3	10	59.7	19.8	7	27.7	59.5	52.5	7	11.8	4	72.3	32.0	0.70	+0.52	4,499	w.	44	n.	12	6	8	13
Concordia.....	1,384	28.50	.....	30.00	30.33	29.28	61.06	41.8	.....	74.9	10	53.2	21.1	13	31.5	50.8	42.7	10	6.0	5	74.9	33.3	0.61	.....	5,303	e.	32	sw.	11	6	8	12
Dodge City.....	2,517	27.36	-.13	30.06	30.41	29.38	61.02	45.2	+6.4	75.5	10	57.6	21.1	13	35.1	54.3	37.8	10	3.4	26	65.2	31.9	0.36	-.030	6,652	n.w.	40	w.	11	2	6	12
Fort Reno.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	84.3	10	67.5	28.5	24	45.4	55.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Supply.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83.0	9	62.6	23.0	13	34.9	60.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Elliott.....	2,650	27.30	-.12	30.11	30.46	29.49	50.95	47.4	+6.4	83.4	10	63.6	21.0	13	34.3	62.4	46.4	10	3.3	26	55.0	28.3	0.25	-.048	6,581	n.w.	51	n.w.	11	2	1	16
Southern slope.																																
Abilene.....	1,745	28.23	.....	30.12	30.47	29.57	50.91	56.2	.....	85.8	17	69.7	27.4	13	45.7	58.4	34.7	9	7.0	26	68.1	44.6	0.23	.....	6,585	sw.	32	sw.	11	3	2	17
Fort Sill.....	1,200	28.75	-.16	30.03	30.37	29.39	50.97	52.0	+4.8	84.0	11	66.3	25.0	13	40.1	59.0	42.5	8	3.8	26	59.3	34.3	1.28	-.075	6,890	n.	38	sw.	21	3	2	16
Fort Davis.....	4,928	25.20	-.19	30.06	30.34	29.58	50.66	54.9	+5.0	81.5	9	70.3	25.0	13	42.2	59.5	42.3	14	13.0	3	41.2	28.9	0.01	-.052	5,145	sw.	32	sw.	10	1	0	9
Fort Stockton.....	3,004	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Stanton.....	2,350	23.96	.....	.....	.....	.....	.....	.....	.....	72.5	19	59.2	15.1	23	30.9	57.4	44.6	10	13.2	21	61.2	30.2	0.50	.....	5,289	n.w.	38	n.w.	21	5	1	18
Southern plateau.																																
El Paso.....	3,764	26.29	-.02	30.11	30.37	29.67	50.70	53.8	+3.2	80.3	10	68.0	23.3	13	39.8	55.0	40.2	14	14.2	5	43.3	29.4	0.31	-.019	3,098	n.w.	28	ne.	12	3</		

in the form of an arch, which extended over 30° of the horizon and to an altitude of 12° .

Mackinaw City, Michigan, 9th: at 7.30 p. m. the clouds disappeared in the northern sky, showing an auroral light of 35° altitude and 90° azimuth; it was of a dull gray color; after 9.45 p. m. occasional streamers shot up to an altitude of 75° ; at 11.45 p. m. the sky became obscured.

Bismarck, Dakota, 9th: a faint aurora was observed at 8.30 p. m., consisting of a pale yellow light, which extended from 135° to 235° azimuth and to 20° altitude; it attained its maximum brilliancy at 10.05 p. m., and disappeared at 10.50 p. m. No dark segment was observed.

Moorhead, Minnesota, 9th: a faint auroral arch was observed at 9.30 p. m., consisting of a white light, of 15° altitude, without streamers.

Fort Yates, Dakota, 9th: a very faint aurora was observed at 10.00 p. m., the sky being partly obscured.

Fort Totten, Dakota, 9th: auroral light was observed in the north at 9 p. m.; it was obscured by clouds at 10 p. m.

Cambridge, Massachusetts: an auroral arch was observed during the evening of the 9th.

Boston, Massachusetts, 9th: an auroral display was observed from 8.30 to 11 p. m.; it extended from 160° to 225° azimuth and to an altitude of 25° ; it was of a pale straw color and was accompanied by "merry dancers."

Albany, New York, 9th: a faint auroral arch of 10° altitude, extending from 150° to 225° azimuth, was observed at 8.40 p. m.; at 11 p. m. the light became diffused and the northwest portion of the dark segment became detached. The light was of a pale straw color, and disappeared at midnight. No streamers appeared. A black cloud extended along the eastern horizon throughout the display.

Escanaba, Michigan, 9th: a bright aurora appeared at 9.08 p. m., consisting of an arch above a bank of clouds; at 10 p. m. a second arch appeared, about 5° above that first observed, with several streamers of bright yellow color. The display continued until early in the morning of the 10th.

Marquette, Michigan, 9th: an aurora was observed at 10 p. m.; the sky being nearly obscured no special features were noted.

Mackinaw City, Michigan, 10th: a faint auroral light was seen from 6.45 to 8.30 p. m.; altitude, 25° ; azimuth, 75° .

Fort Totten, Dakota, 10th: a faint auroral light in the north was seen at 10 p. m., the display ending at 4 a. m. of the 11th.

Bangor, Maine, 11th.

Fort Buford, Dakota, 11th: an auroral display began at 10.14 p. m.; when first observed two streamers, of a whitish color, extended to about 40° ; they were nearly stationary, and had a slight reddish hue near the horizon; at 10.40 p. m. the streamers gradually diffused along the horizon to about 8° to 10° altitude and 40° azimuth, between north-northwest and northeast, forming a bank having the appearance of smoke, which continued until 11.10 p. m., after which the aurora gradually disappeared.

Menand Station, New York, 14th: at 9 p. m. three parallel arches, having about 15° altitude and 120° azimuth, extended from north to southeast; the uppermost arch was apparently 3° in width; the lower one exhibited faint lines of light, without motion; the display disappeared at 9.30 p. m.

Cambridge, Massachusetts, 17th: an aurora was suspected at 8.45 p. m.

The following stations report auroras, the observers giving dates only:

6th.—Thornville, Michigan.

7th.—Birmingham, Michigan; Napoleon, Ohio; North Volney and Ithaca, New York; Beverly, New Jersey.

9th.—Webster, Dakota; Cresco, Iowa; Kent's Hill, Maine; Manistique, Michigan; Embarras, Manitowoc, and Prairie du Chien, Wisconsin; Southington, Connecticut; Riley, Illinois.

10th.—Webster, Dakota; Gardiner, Maine; Westborough, Massachusetts.

11th.—Gardiner and Orono, Maine; Burlington, Vermont.

12th.—Atchison, Kansas; Harvard, Nebraska; Yellow Springs, Ohio.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories, as follows:

Alabama.—Mobile, 5th, 7th; Birmingham, 6th; Greensborough, 6th, 7th, 22d; Montgomery, 6th, 7th, 23d.

Arizona.—Prescott, 3d; Fort Grant, 3d, 4th.

Arkansas.—Fort Smith, 4th, 5th, 17th; Little Rock, 4th, 5th, 6th, 17th, 18th; Mount Ida, 4th, 5th, 26th, 27th; Lead Hill, 5th, 18th.

California.—Sacramento and College City, 10th; Keeler, 16th; San Rafael, 22d.

Florida.—Limona, 7th, 8th; Sanford, 7th, 19th; Tallahassee, 23d; Key West, 28th.

Georgia.—Forsyth, 6th; Augusta, 6th, 7th; Atlanta, 6th, 7th, 23d; Athens, 6th, 22d.

Illinois.—Chicago and Mattoon, 4th; Sandwick, Windsor, and Charleston, 4th, 6th; Springfield, Cairo, Anna, Geneseo, Sycamore, and Bloomington, 6th; Collinsville, 21st, 22d; Bunker Hill, 22d.

Indiana.—Greencastle, 4th, 6th, 18th; Vevay, Jefferson, Sunman, and Spiceland, 6th; Indianapolis and Guilford, 6th, 7th; Fort Wayne, 6th, 7th, 17th; Laconia, 6th, 22d.

Iowa.—Keokuk, Burlington, Dubuque, Davenport, Independence, Monticello, Manchester, Des Moines, Oskaloosa, and Muscatine, 6th; Cedar Rapids, 6th, 8th.

Kansas.—Ninnescah, 3d, 4th; Allison, 3d, 5th, 30th; Independence and Yates Centre, 4th; Ottawa, 4th, 5th, 18th; Fort Scott, 17th; Wyandotte, 21st.

Kentucky.—Louisville, 6th; Richmond, 7th, 22d.

Louisiana.—Grand Coteau, 1st, 5th, 6th; Shreveport, 4th, 5th, 6th; New Orleans, 5th.

Maryland.—Ocean City, 8th.

Michigan.—Thornville, 5th; Grand Haven, 6th; Manistique, 6th, 7th; Marquette and Mackinaw City, 7th; Escanaba, 17th.

Mississippi.—Vicksburg, 6th, 7th.

Missouri.—Pierce City, 3d to 6th; Conception, 5th; Centreville, 17th; Saint Louis, 22d.

New Jersey.—Atlantic City and Dover, 8th.

New York.—Mountainville, 8th.

North Carolina.—Fort Macon and Hatteras, 1st; Smithville, 1st, 7th; New River Inlet, 2d, 8th, 18th, 19th; Charlotte and Lenoir, 6th; Weldon and Kitty Hawk, 8th.

Ohio.—Fostoria, 5th; Cincinnati, Sandusky, North Lewisburg, Wauseon, Yellow Springs, and Napoleon, 6th; Columbus, Cleveland, Toledo, Hiram, and Garrettsville, 7th.

Oregon.—Albany, 3d, 4th, 5th; Bandon, 17th, 24th.

Pennsylvania.—Blooming Grove, 8th.

South Carolina.—Stateburg, 1st, 6th, 7th, 18th; Aiken, 6th, 7th; Spartanburg, 6th, 7th, 8th, 10th, 22d.

Tennessee.—Milan, 5th, 6th, 7th, 18th; Nashville, 6th, 7th; Chattanooga, 6th, 7th, 18th, 22d; Ashwood, 6th, 18th; Knoxville, 6th, 22d.

Texas.—New Ulm, 1st, 3d, 4th, 6th; San Antonio, 3d, 4th; Palestine, 3d, 4th, 5th; Galveston, 3d, 4th, 27th; Cleburne, 4th, 5th, 6th; Rio Grande City, 7th; Brownsville, 27th.

Virginia.—Variety Mills and Wytheville, 6th; Chincoteague and Dale Enterprise, 8th.

Washington Territory.—Pysht, 7th, 8th, 26th; Tatoosh Island, 8th.

West Virginia.—Parkersburg, 6th.

Wisconsin.—Embarras and Manitowoc, 6th; Milwaukee, 6th, 7th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories, as follows:

Arizona.—1st.

Arkansas.—3d, 17th, 26th.

California.—1st to 4th, 6th, 7th, 23d, 26th, 27th.